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Nitrogen Balance Studies Used to Estimate the Protein Requirements in Adults

TABLE M-1 Nitrogen Balance Studies Used to Estimate the Protein Requirements in Adults

Reference	Country	Study Type ^a
Agarwal et al., 1984	India	Primary estimation
Atinmo et al., 1988b	Nigeria	Primary estimation
Bourges and Lopez-Castro, 1982	Mexico	Primary estimation
Cheng et al., 1978	Chile	Primary estimation + test
Clark et al., 1972	United States	Primary estimation
Dutra de Oliveira and Vannucchi, 1984	Brazil	Primary estimation
Egana et al., 1992	Chile	Primary estimation
Egun and Atinmo, 1993b	Nigeria	Primary estimation
Fajardo et al., 1981	Columbia	Primary estimation
Hussein, 1984	Egypt	Primary estimation
Inoue et al., 1981	Japan	Primary estimation
Istfan et al., 1983b	United States	Primary estimation
Kaneko et al., 1988	Japan	Primary estimation
Ozalp et al., 1984a	Turkey	Primary estimation
Scrimshaw et al., 1983	United States	Primary estimation
Thomas et al., 1979	United States	Primary estimation
Tontisirin et al., 1981b	Thailand	Primary estimation
Uauy et al., 1978b	United States	Primary estimation
Yanez et al., 1982	Chile	Primary estimation
Young et al., 1984	United States	Primary estimation

Subjects	Age (y)	Protein Source
6 men, 5 women	25–39	Vegetable: rice, wheat
15 men	19–21	Mixed: beef, rice
11 men	15–30	Animal: milk + vegetable: corn, beans
14 men	23–29	Mixed: milk, wheat, soy
	60–73	
5 men, 1 woman	22–26	Mixed: milk, wheat, rice
9 men	18–28	Vegetable: rice, beans
14 men	18–31	Animal: egg + vegetable: lupin
12 women	21–32	Mixed: rice, wheat, beef
12 men, 2 women	21–26	Mixed: meat, wheat, potatoes + vegetable: rice, beans, potatoes
8 women	18–27	Mixed
21 men	19–28	Animal: fish + vegetable: soy + mixed: fish, soy
8 men	18–21	Vegetable: soy
12 women	18–24	Mixed
11 men	19–26	Mixed: wheat, yogurt
22 men	18–23	Animal: milk + vegetable: soy
7 women	18–23	Vegetable: cottonseed
13 men	19–27	Animal: egg
7 men, 7 women	68–84	Animal: egg
15 men	20–31	Mixed: wheat, milk + animal: egg
15 men	20s	Animal: egg + vegetable: soy

continued

TABLE M-1 Continued

Reference	Country	Study Type ^a
Huang and Lin, 1982	China	Secondary estimation
Inoue et al., 1973	Japan	Secondary estimation
Kaneko and Koike, 1985	Japan	Secondary estimation + energy
Komatsu et al., 1983	Japan	Secondary estimation
Wayler et al., 1983	United States	Secondary estimation
Xuecun et al., 1984	China	Secondary estimation
Young et al., 1973	United States	Secondary estimation
Young et al., 1975	United States	Secondary estimation
Zanni et al., 1979	United States	Secondary estimation + obligatory
Atinmo et al., 1985	Nigeria	Obligatory
Bodwell et al., 1979	United States	Obligatory
Bricker and Smith, 1951	United States	Obligatory
Calloway and Margen, 1971	United States	Obligatory
Huang et al., 1972	China	Obligatory
Inoue et al., 1974		Obligatory
Nicol and Phillips, 1976a	Nigeria	Obligatory
Scrimshaw et al., 1972	United States	Obligatory
Scrimshaw et al., 1976	United States	Obligatory
Tontisirin et al., 1981a	Thailand	Obligatory
Uauy et al., 1978a	United States	Obligatory
Uauy et al., 1982	Chile	Obligatory + energy
Young and Scrimshaw, 1968	United States	Obligatory
Atinmo et al., 1988a	Nigeria	Test
Bourges et al., 1984	Mexico	Test
Campbell et al., 1994	United States	Test
Castaneda et al., 1995	United States	Test
Dutra de Oliveira et al., 1981	Brazil	Test
Egun and Atinmo, 1993a	Nigeria	Test
Gersovitz et al., 1982	United States	Test
Istfan et al., 1983a	United States	Test
Nicol and Phillips, 1976b	Nigeria	Test
Oddoye and Margen, 1979	United States	Test
Ozalp et al., 1984b	Turkey	Test
Ozalp et al., 1984c	Turkey	Test
Tontisirin et al., 1984	Thailand	Test
Uauy et al., 1984	Chile	Test
Xuecun et al., 1984	China	Test
Yanez and Uauy, 1984	Chile	Test
Young et al., 1984	United States	Test

^a Primary estimation = studies designed to estimate requirement by feeding a number of individuals several different intake levels; test = studies not designed to estimate requirement, usually involving long experimental periods for a single level; energy = studies designed to study the effects of varying energy intake; secondary estimation =

Subjects	Age (y)	Protein Source
41 men	20–29	Animal: egg + mixed
25 men	20–27	Animal: egg + vegetable: rice
15 women	18–22	Animal: egg
28 men	19–30	Animal: amino acids (egg)
34 men	18–26	Animal: beef + animal: milk + mixed: beef, soy
10 men	26–41	Mixed: rice, wheat, pork, egg
19 men	18–28	Animal: egg
15 men	18–24	Animal: beef + vegetable: wheat
6 men	63–77	Animal: egg white
15 men	19–39	
13 men, 11 women	19–52	
25 women	19–30	
13 men	21–37	
50 men	20–32	
9 men	Young	
9 men	21–30	
83 men	18–26	
11 women	67–91	
4 men	21–25	
8 men	68–72	
8 men	24–31	
8 men	17–22	
12 men	22–29	Mixed: beef, rice
20 men	19–25	Vegetable: corn, beans
8 men, 4 women	56–80	Mixed: milk, egg, vegetable
12 women	66–79	Mixed: milk, vegetable
14 men	17–26	Mixed: rice, beans, meat, milk
11 women	21–30	Mixed: rice, wheat, beef
7 men, 8 women	70–99	Animal: egg
6 men	18–26	Vegetable: soy
17 men	21–30	Vegetable: rice
12 men	23–30	Animal: egg + mixed: egg, soy
49 men	19–30	Mixed: wheat, yogurt
15 men	19–28	Mixed: wheat, yogurt
12 men	19–26	Mixed: rice, fish
53 men	18–19	Mixed: wheat, rice, milk
6 men	24–45	Mixed: rice, wheat, pork, egg
8 men	19–33	Mixed: wheat, rice, milk
32 men	20s	Animal: egg + vegetable: soy

studies that present only mean data or studied different individuals at each intake level; obligatory = studies that examined responses to zero or very low nitrogen intake.
SOURCE: Adapted from Rand et al. (2003).

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